DOCUMENT RESUME

ED 030 909 CG 004 002

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Can A Machine Admit An Applicant to Continuing Education? Information System for Vocational Decisions. Project Report Number 19.

American Personnel and Guidance Association, Washington, D.C.; Harvard Univ., Cambridge, Mass. Graduate School of Education.

Spons Agency-Office of Education (DHEW), Washington, D.C.

Pub Date Jan 69

Grant-OEG-1-6-061819-2240

Note-29p.; Paper was presented at the American Personnel and Guidance Association Convention, Las Vegas, Nevada, March 30--April 2, 1969.

EDRS Price MF-$0.25 HC-$1.55

Descriptors-Admission (School), Admission Criteria, *College Admission, Competitive Selection, *Computers, *Counseling, Decision Making, Information Processing, *Information Systems, *Testing

An Admissions Machine is defined as a sub-set of procedures in a Career Machine which an applicant and an admissions officer can use collaboratively in an interactive interrogation and report system when the applicant expects fair treatment from the admissions officer and the admissions officer trusts the judgment of the applicant concerning the appropriateness of the institution for him. The specification of an Admissions Machine which has the same purpose for admission to continuing education as does testing but at the same time becomes a new means for those same ends and places new perspective on tests as a means for admission to continuing education. The faults of testing are examined in that perspective. (Author/EK)

ED030909

INFORMATION SYSTEM FOR VOCATIONAL DECISIONS

Project Report No. 19

CAN A MACHINE ADMIT AN APPLICANT TO CONTINUING EDUCATION?

David V. Tiedeman

This paper was supported in part by Grant No. OEG-1-6-061819-2240 of the United States Office of Education under terms of the Vocational Education Act of 1963.

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January, 1969

CG 004002

Abstract

The question, 'Can a machine admit an applicant to continuing education?' is addressed seriously. A machine is defined as the procedure it embodies. A computer is therefore many machines since it embodies many procedures both simultaneously and in sequence.

A machine which will admit applicants to continuing education can be conceived as 1) being, 2) acting like, or 3) having the same goals as an admissions officer. Alternatives 1) and 2) are rejected in favor of 3) in order to consider an Admissions Machine in which the purposes of the machine and an admissions officer coincide but in which the machine is unencumbered by unnecessary human activities.

The purpose of admissions to continuing education is to admit applicants likely to prove satisfying to an institution's goals and the exclusion of all others. This definition of purpose presumes both that applicants and faculty honor self-correcting activity and that their organization does not contradict such honoring.

Within the above purpose a Career Machine is described in which comprehension of the epigenesis of decision-making development is expected. The Admissions Machine is then defined as that sub-set of procedures in the Career Machine which the applicant and admissions officer can use collaboratively in an interactive interrogation and report system when the applicant expects fair treatment from the admissions officer and the admissions officer trusts the judgment of the applicant concerning the appropriateness of the institution for him.

The specification of an Admissions Machine which has the same purpose for admission to continuing education as does testing but at the same time becomes a new means for those same ends places new perspective on tests as means for admissions to continuing education. The faults of testing are examined in that perspective. The faults are both new purposes which can't be fulfilled by tests but can by machines and better means for fulfilling the existing purposes of tests.

CAN A MACHINE ADMIT AN APPLICANT TO CONTINUING EDUCATION?*

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OFFICE OF EDUCATION

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*Speech, American Personnel and Guidance Association, Las Vegas, Nevada, 30 March - 2 April 1969.

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The Commission on Tests of the College Entrance Examination Board

When Warren Findley suggested today's program last year, I was of the opinion that the College Board's Commission on Tests would be pounding down the home stretch at this moment. Findley and I therefore thought that Pearson and I would today be able to share the probable recommendations of the Commission at least in broad outline, a hope that I regret has not materialized.

Although Pearson and I cannot yet speak for the Commission, we were mindful of Findley's hope that we would as we wrote our papers. Each of us is therefore trying to give you important clues concerning the Commission's work. However, we both emphasize that we speak personally, not for the Commission as a whole. A Commission view does not exist at this moment.

The Argument

Our Question. Seriously address with me the question, 'Can a machine admit an applicant to continuing education?' I believe that we can thereby understand a considerable break with the tradition of testing which I think the Board should entertain. It is my personal view that the Board has done as well as it can on the present theory of testing which the Board and the Educational Testing Service had a considerable hand in both shaping and using. A new theory is necessary if a truly improved Board admissions program is to appear. My purpose is to sketch out one way in which a new theory can be approached.

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*Speech, American Personnel and Guidance Association, Las Vegas, Nevada, 30 March - 2 April 1969.

Attacking the Question. In attacking the question, 'Can a machine admit an applicant to continuing education?,' we could adopt the form of argument which Turing (1964) used in asking whether a machine can exhibit intelligence or not. Turing's attack was to substitute an operational procedure for his original question, namely, 'Can a machine act intelligently?' In doing so, he substituted operations which a computer could perform and thereby achieved an illustration in which it became possible to answer his question affirmatively, a goal he sought but which I do not necessarily seek.

Since I am not interested in having machines actually admit applicants to continuation of their education but merely in exposing new means whereby we can question present means of doing so, I prefer a second attack on the question which Ellis and I have jointly used (Ellis and Tiedeman, 1968). In using this second form, I first propose as I already did that we take the question seriously, not to get us committed to an affirmative answer bur rather to help us see that we must first unencumber the question from some usual connotations before we have terms capable of sharper address and hence of likely progress. I shall only then speculate upon the properties of a machine which can satisfy those purposes of admission to continuing education. I shall finally note that existing test theory lacks some of those needed properties and propose some new means of getting what is needed.

A Machine in Broad Perspective. In addressing the question 'Can a machine admit an applicant to continuing education?' let us first agree on what a machine is. I propose, as Ellis and I did before, that "machines execute procedures and each machine is the embodiment of the procedure it

executes." (p. 2) Thus, in effect, a statement of a procedure will also describe the machine needed to carry it out. There need be no existing machine capable of presently carrying out every stated procedure. The procedure need only specify what our proposed Admissions Machine would have to do, not what it presently does.

A computer happens to be one form of a machine which makes concern for my question interesting. Computer programs define procedures which the computer is to execute and thereby make the computer become one machine after another depending upon what procedures the computer is to embody in any instant. Thus computers give us capacity to consider whether a machine can admit an applicant to continuing education or not in terms of not one but many procedures.

Substitution in Specifying Machine Procedures. It is necessary to specify the procedures to be carried out if we are to widen and deepen our understanding of our question. One kind of substitution would be to place human procedures into our proposed Admissions Machine. However, as I shall show, human substitution has two difficulties which cause me to reject it, not to pursue it.

One human procedure we could propose is that our Admissions Machine be an admissions officer. I elect not to make this substitution in my question because it creates more problems that it solves. I want an Admissions Machine for which it is only necessary to achieve stated ends, not to be various persons. This exclusion thereby limits the demands on my Admissions Machine fairly considerably.

A second human substitution which occurs to many persons, particularly behaviorists, is that the Admissions Machine should act like an admissions

officer. The difficulty is making my machine act like an admissions officer is that certain needless admissions acts which admissions officers do merely because they are human would thereby necessarily be included in my procedure. I therefore also reject this substitution because I prefer a substitution in which I can free the machine from encumberances which are unnecessary even though they are human.

In order to free the machine from the encumberance of unnecessary procedures arising from fashioning its programs so that they either are or act like humans, I adopt a third substitution. I shall substitute for my original question procedures in which the ends of the admissions officer and the ends of the machine are identical. It shall therefore not be necessary that the means of the admissions officer and of the machine be identical although there is also no reason to avoid making their means alike when doing so does not needlessly encumber the machine.

Purpose of Admission to the Continuation of Education

A Satisfying Education When Continued. I suggest that we take the purpose of admission to continuation of education to be the acceptance of candidates likely to prove satisfying to the goals of the institution and the rejection of all others. I choose the gerundival form of the verb 'to satisfy' so that I may include in the purpose of admission the necessity for the applicant himself to become satisfied with his education while he is being educated. The implications of such inclusiveness are 1) that admissions officers cannot be satisfied merely that their admitted candidates are satisfactory upon admission, and 2) that the symmetry

necessarily implied in educational satisfaction requires both that the applicant as later student become satisfied during his admission and education and that the institution as resource for enlargement of the student's intelligence be satisfied throughout the applicant's admission and later education.

If the continuation of education is to prove satisfying to the goals of the institution admitting the applicant as specified, admitted candidates who by then are students must themselves set goals for the institution. Students who do so give the institution chance of viable existence. Students who live by personal goals at admissions will let the institution exist so that they can in turn assume obligation during their education to live with its goals as well. Students who live the goals of the institution will both live by them and live with them. In living with the goals of an institution, students will become the critics of those goals and offer the institution opportunity for its perpetual change--probably its improvement as well.

Self-Correction and the Satisfying Continuation of Education. I propose that institutions and admitted applicants will prove most satisfying to institutional goals if both are subject to expectations for self-correction (Gannaway, 1968). The basic process of self-correction is creation. Ideational creativity, the goal of education, requires the student to relate himself to his experience and his environment so that he is both tentative about some things and from time to time committed to other things. These dual conditions permit the mind to play with ideas both as wholes and as parts. The wholeness of an idea allows one to deal in theory with its conceptually divided parts. The parts of an

idea allow one to experience ideational aspects of a totality in intensity necessary for comprehension of the totality. Frequently the whole suggests parts not yet envisioned. Occasionally parts coalesce into wholes as yet unimagined. Maintenance of the belief in one's capacity for self-correction affords safeguard for the fact of self-correction. Since the belief is itself personal and inseparable, it must be experienced as a whole although we can encourage its emergence by partial action.

The maintenance of the sense of self-correction makes demands on applicant and institution alike. For the institution, the belief means 1) that a significant portion of its officers are capable of self-correction and 2) that the organization of the institution does not contradict the expectation for self-correcting activity on the part of such enlightened officers. For the applicant this means 1) that he must be given opportunity to share in goal determination of the institution even at the time of his admission, 2) that he must perceive this opportunity as fairly offered and fairly administered, and 3) that he must be capable of self-correction at his admission and throughout his education in the institutions.

Science and Self-Correction. Self-correction is the attitude foundational to science, as well as to personal development. I therefore further elaborate my meaning of self-correction in personal development through consideration of the more commonly understood principle of science. I refer, of course, to the process of science, not necessarily to the products of scientists. Informal and formal testing both are inherent in the process of science. I want particularly to discuss the role of both kinds of testing in the conduct of science.

We engage in informal testing intermittently in daily living whether we are scientists or not. Through such informal testing we sharpen in self-correcting

ways our understanding of the relationship between ourselves and our experience and environment. Scientists additionally formalize such thought, or tests in which they are willing to think one way or another depending on the outcome of an observation contingent upon a prior supposition, and call it "doing science." Scientists 'do science' with concepts they have formed about their relationship between themselves, their concept, and the experience which they are attempting to understand by means of their concept. This idea about science is not novel. Polanyi relies upon it (1966). Bronowski (1965) additionally explicitly grounds the identity of man in it as I am suggesting that we also do.

The primary paradigm which I am proposing for self-correction as 'doing science' is that every man seeks clarification of the relationship between an idea he has and his experience (including others' summaries of that experience). If power is expected from this primary relationship it must be additionally studied in a secondary relationship in which one comprehends his person both as the inventor and evaluator of the concept and the agent of experience of the phenomenon under study. Actually it is impossible to separate in experience the primary and secondary relationships; the one continually interacts with the other. It is therefore necessary to conceive the two as figure and ground in phenomenological interaction. What ordinarily eventually happens when comprehension takes place is that concept and experience are given primary position as figure within the ground which is the 'I-and-concept' relationship. The processes by which this effect happens occur normally. However, it is also possible for these processes to become much more available in awareness. Furthermore, it is possible for that awareness further to sharpen decision-making activity, particularly personal

responsibility for decisions. The comprehension of the process itself matures very slowly in man's cognitive development. As I shall indicate in my ensuing discussion of a Career Machine, the effect can be helped to occur sporadically throughout life. However, comprehension of the general elements of the process occurs more slowly and largely in terms which so far have only been described in metaphysical terms. However, illustrations abound in which the capacity to comprehend process has reality, even if only an illustrative reality in each of many specific instances. It does therefore appear to be a developed capacity of which man is actually capable even though the processes inherent in the secondary differentiation seem to mature more belatedly than do the processes inherent in the primary differentiation.

Formal testing differs importantly from informal testing. The important difference is that formal testing must be conceived in public terms; informal testing can occur largely in private terms.

There are two lines of thought relevant to the distinctions and illustrations I have so far used in proposing a relationship between informal and formal testing. One line of thought is relevant to 'doing science' itself. The other is relevant to admissions testing itself. I follow the science line first in this section; the admissions testing line is pursued subsequently in a following section in which the Admissions Machine is outlined.

<u>'Doing Science' and Formal Testing</u>. The scientists tries to bring into the public realm the understanding which he achieves because of informal tests of his concepts and experience. This advance requires that understandings which are formerly tacit must be made explicit. As

the scientist makes his tacit understandings explicit, he moves them from his private realm to the public realm. As the scientist moves his understanding from his private realm to the public realm, he finds himself explaining not alone what he knows but also the bases upon which he claims to know it. These bases as they enter the public realm become the material which others can use to examine the scientist's impression of what he understands. In the pursuit of science, those bases occasionally become formalized and serve as tests which other persons in turn apply to the relationship between concept and experience which the scientist claims he understands. As this process occurs, investigations which are formerly fluid in Schwab's language (1962) or 'whole' in my language of self-correction later become static or partial in my language of self-correction. In static or partial investigations, the bases of understanding are kept fixed while the realms of application of those bases are varied. Static investigations therefore ordinarily expand and clarify just the limits of application of an original understanding. Fluid or whole ideation on the other hand, is ordinarily relatively free of former restraints placed on static investigations. Such freeing in turn allows concepts and experiences to be "seen" and presented in new lights. When the freeing is a superordination of previously less well ordinated static restraints, science or persons are said to progress. When the freeing is the establishment of new restraints but in a different field of awareness, science or persons are said to become diversified or some such similar term.

Means and Ends. My argument so far first noted that the purpose of admission in the continuation of education should be the acceptance of

candidates likely to prove satisfying to the goals of the institution and the rejection of all others. I then argued that the sense of self-correction must be preserved if students are to achieve a continuation of education satisfying to applicant and institution alike. I finally noted that awareness of 'doing science' in personal living, particularly the doing of 'formal testing in science,' is the aspect of self-correction critical to a satisfying education.

I undertook my particular specification of purpose in admission to the continuation of education so that I may now point out the existence of a fundamental flaw between the way tests are presently used in admissions to continuing education and the end of cultivating self-correcting activity because of admission and study in continuing education. The flaw is that applicants are not collaboratively involved by admissions officers in the problem of goal specification and pursuit in the admissions process. Tests by themselves offer no present opportunity to correct that situation. It is therefore this flaw which the Admissions Machine I am engaged in specifying in this paper must eliminate.

An Admissions Machine

An Admissions Machine as an Integral Part of a Career Machine. If my defined sense of self-correction is not to be seriously contradicted during admission to the continuation of education, admission should be carried out as an integral part of the emerging self determined and corrected career. The cultivation of the awareness of 'doing science,' particularly the awareness of 'doing formal testing,' in living can be

achieved during admission to the continuation of education if the needed Admissions Machine is planned as a part of a Career Machine which is now under specification and partial construction as an Information System for Vocational Decisions* (ISVD). In an ISVD, a relationship is arranged between an inquirer and certain facts. In my particular ISVD facts are of four kinds: 1) occupation; 2) military service; 3) education; and 4) personal and family living. The ISVD expects the inquirer to turn facts and data into information. The turning of facts and data into information is cultivated by four machine functions: 1) exploration; 2) clarification; and 3) planning, each of which is in the anticipation phase of the Tiedeman and O'Hara (1963) paradigm of decision-making development; and 4) review, which is in the accommodation phase of that paradigm. The expectation that facts and data will be turned into information is in turn supervised or monitored by the machine. The monitoring is governed by the assumption that the person will become self-correcting in his use of these functions. The principal goal of that self-correction is the mastery of the paradigm of decision-making development. The comprehension of this epigenetic** phenomenon of decision-making development is the end product expected of repetitive use of an ISVD. The comprehension probably occurs developmentally in ways as yet unknown but undoubtedly occurs over an extended period, probably the period of the life itself.

The major condition leading in potential to the comprehension of

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*Principal Investigators of the Information System for Vocational Decisions are: Russell Davis, Richard Durstine, Allan Ellis, Wallace Fletcher, Edward Landy, Robert O'Hara (Executive Director), and David Tiedeman (Chairman).

**Epigenesis is successive differentiation and integration from previously unformed circumstances.

decision-making development is the monitoring function I have just mentioned. The monitoring function is programmed in the ISVD Career Machine to detect and report occurrences in the inquirer's interaction in the machine in which he is seemingly projecting when the system expects him to assume responsibility for his activity and understanding during exploration, clarification, planning and review about the current, past, and likely future points of decision in his career development. Monitoring in the ISVD will be conducted under expectation that the inquirer may ask for the basis of the system's judgments at any time. The system will be programmed to report thoses bases and to invite the inquirer to modify them if he is so inclined. This procedure constitutes the sense in which the ISVD "will reveal itself," or at least its procedures, a condition which Ellis and I (Ellis and Tiedeman, 1968) declare to be the major object in counseling. Should the inquirer act upon the machine's invitation to modify the bases for system monitoring of his own interaction, he begins the construction of a personal or truly esoteric information system. The degree to which the inquirer can either extend or change the public monitoring function represents the degree to which he can plumb his intuitions and make them articulate with the ways of expression of self which are system delineated. The inquirer is thereby helped to make his tacit understandings explicit at least to himself and probably to others should he elect to do so.

The assumption and practice of responsibility for monitoring one's activity while inquiring causes understanding of a <u>particular</u> decision-making development. The comprehension of <u>how</u> one is interacting with the system to get such an understanding is the epigenetic process of decision-

making development. When this experience occurs frequently, the inquirer becomes explicitly its master, and in reality thereby becomes master of his self. However, there is an important set of steps in my explanation which must be known for your own comprehension of my argument.

The ISVD system will use the Tiedeman and O'Hara paradigm of decision-making in vocational development as an explicit model which inquirers will be expected to master through repeated use of the ISVD. However, more importantly, through interaction with the system and with counselors who are aware of and attempting to facilitate the more general effect, inquirers are expected to master the epigenetic process of decision-making development or of 'doing science' itself. Inquirers having such mastery are skilled in the use of purposeful action (Field, 1968), of self-correction (Gannaway, 1968), and of 'doing science' or reasoning either in the sciences themselves or in the humanities as well.

The Admissions Machine in Broad Outline. The existence of an ISVD Career Machine would simplify the admissions process if applicant and admissions officer both believed that the other was self-correcting and mutually decided to share facts and data in order to collaborate in deciding, as the admissions officer must, whether this particular applicant should be admitted to his particular institution or not. The prior uses which the inquirer had made of an ISVD would give him a means of now characterizing his decision to apply to a particular institution so that the admissions officer could, with the inquirer's permission, be privy to what and how he had thought, not just that he capriciously now wanted admission to institution X. The admissions officer could examine this record for detail, complexity, integrity, and self-correcting

activity. The admissions officer could also plumb the record for the goals which the applicant wanted to fulfill and for the applicant's justification that such goals could be fulfilled collaboratively at institution X with its now stated goals and existing procedures for self-correction of institutional goals.

The self-correcting processes which Bronowski (1965) and Gannaway (1968) define depend upon the individual's capacity to examine honestly and continually the relationship of himself to his experience. When an individual is doing so he is in reality acting as a scientists about his self-processes. My belief is that the major issues in such an examination at the time of application to continuing education are 1) the nature of the outside as that outside is known to others, and 2) the nature of purpose (Field, 1968) as its nature can be known collaboratively to applicant and admissions officer alike. The Admissions Machine should therefore contain an Admissions Game which can be used by an applicant in familiarizing himself with another's experience about admissions to continuing education. A further widening and deepening of the context for collaborative testing action between applicant and admissions officer which I shall discuss in detail in the next section can then help both to move the decision of admissions from its present base which is almost gamelike to a more intimate base in which the aspirations and evaluations of applicant and admissions officer are more penetratingly known to both. The instrument for such exchange will be a computer-based <u>interactive</u> admissions system, or an Admissions Machine. In such systems, an admissions officer can combine both the Admissions Game and his subsidiary decisions. The embedding of game and decision bases into an interactive information exchange will

naturally expand the area of application of the admissions officer's thought about applicants and their intentions and accomplishments. The use of such an extensive system will give applicants a sense of participation in admissions to their continuing education the like of which is not now possible in standardized testing.

Implications of an Admissions Machine for Test Theory and Practice

Testing for Admissions to Continuing Education. Although the admissions officer would gain from the availability of an ISVD-like self-correcting record of an applicant's career as I have noted in the previous section, there will undoubtedly be additional information which the admissions officer would like to have. The desired additional information would likely be both of a factual and of a test kind. I shall not say more about needed factual information because it is likely to be specific to an institution and should be planned and obtained with that expectation in mind. However, I shall treat the problem of testing itself in relation to a potential Admissions Machine much more thoroughly since that is the principal interest of our Commission.

The Process of Science and Admissions Testing. The process of science contributes in two ways to admissions testing. First it forms a means of showing what admissions testing presently is. Secondly it suggests a model of what admissions testing might become.

Admissions testing presently takes place under static conditions. For all practical purposes, psychometricians presently conceive admissions testing merely on grounds that an institution can know what it wants and

how to get it by comparing the Board's predictor indexes with the series of grades achieved by the institution's classes of the years past. Psychometrician's thereby cast the admissions problem into a static mold because it is conceived as merely requiring identification of characteristics visible prior to admissions which bear the transition from pre-admission circumstances to the satisfactory post-admissions continuation of education.

The present procedure of formal admissions testing thus constitutes only a feedback loop, that is the criterion is fixed and the test and associated admissions studies provide probability data in relation to the fixed criterion. A feedback system is static so far as its restraints are concerned. However, one of the ways in which a feedback system has been moved toward a dynamic or more fluid condition in which feedforward then starts to be available has been to use the results of feedback obtained within existing contraints to make the feedback operate to correct the direction in which an object is moving. This is the sense in which feedback operates in missile guidance systems, in power steering of automobiles, and the like. This is also the sense in which psychometricians presently construe guidance as based in existing test theory.

If the planning function of my ISVD-like Career Machine were constructed and used as an Admissions Game in an Admissions Machine, the Board would create a first movement from a static test system to a dynamic information-creating system. Although the static system of college admissions based in present Board tests is for the most part presently deterministic, the effects of some of that determinism can be somewhat alleviated in the students subject to it by also causing them to comprehend

the "theory of the Admissions Game," as well as to take tests processed in secret by admissions officers. This is equivalent to the takeover of the public monitor by the inquirer as I described the process in the ISVD Career Machine. Students who become expert in such a game are more likely to petition for admission to continuing education on grounds which allow them to act a little more intuitively within both the restraints of the present "game" and the operation of those restraints on their desires. I consider this to be the first stage of moving admission to the continuation of education to grounds which are more fluid or self-correcting than the existing static grounds.

Widening the Data Context in Formal Testing. It is now possible to widen the context of data processed by admissions officers without sacrifice of either accuracy or accountability. The widening can be accomplished by shifting the basis of questions from multiple response to free answer. This alternative has not in the past been fully exploited both on grounds of feasibility (it takes too long to process answers in the short turn-around time between receipt of answers and need for processed results) and on grounds of reliability (you can't get readers to agree on evaluations of responses). These objections are of a different kind and should therefore be dealt with on different grounds. The availability of computers now makes it possible in short order to process a response entered into the computer by an applicant. In fact, the computer can convey its response to the applicant himself as well as to any other party permitted access to the question-response sequence. Thus the matter of time becomes irrelevant if we program testing so that questioning, answering, and processing are done almost simultaneously.

The other objection has to do with the reliability of evaluating free response questions. Philip Stone and associates (1966) have developed a procedure for computer recognition and response to key words in context. Fred Ferris (informal report, 1968) has been one (probably there are others as well but I do not know of their work at this time) who has picked up this processing idea and exploited it in relation to the provision of Board test items which can be answered as problems, not as selections among previously provided possibilities. With care, it then becomes possible to write questions as problems and to provide for the processing of answers according to analyses of key words in context.

If the processing of key words in context is done while the applicant is in active interaction with computer programs, further gains become possible. These further gains are 1) that the responses identified by the computer can be relayed to the applicant before he leaves the system, and 2) that he can be asked to verify or revise such identifications before he leaves the system. The applicant's revisions can in turn be made a matter of record and report to the admissions officer. This procedure therefore bypasses one of the major problems of reliability, namely keeping the process sensitive to what the applicant intended. An additional gain is that the computer program can also report to the applicant what he has replied in relation to its processing by the test-maker's judgment of the 1) complexity, 2) completeness, and/or 3) accuracy of his answer. What I am thinking about here is a new form of reporting, not a reporting which merely relates to the ultimate correctness or incorrectness of a response. I am thinking of a response processed according to the numerous alternatives which surround the tackling of

a problem. This possibility has some exciting additional consequences for me. It bypasses the problem of reliability still further than I have already attributed to getting the applicant in on the scoring of his response. This time the bypass is to have the test-maker provide scoring of the response in outside terms and then to use that outside scheme both to score the response in his terms and to share the report of such scoring with the applicant. In sharing the scoring report with the applicant, if the applicant notices anything awry with his score, he can report such impressions. This eliminates another issue in reliability. However, the major reliability issue in test theory has to do 1) with the sampling of questions which are included in a test, and 2) with the assessment of the possibility that the level of a person's score on a sample of test items will remain relatively constant in relation to a comparison group when both sampling of content and testing of applicant is varied. Why sample content? Why compare applicants with other applicants?

I grant that I ask difficult questions. However, I trust that you take my proposals seriously, not dismiss them out of hand as immediately unfeasible. In its ultimate form, the question of sampling content is indefensible. It may prove valid with a few things like sets of arithmetical operations. However, in a real sense each question is a unique question. When different questions are placed in sets, their categorization then becomes subject to question by anyone who knows the subject. These questions are ordinarily argued in test construction committees at the Board. Placements of questions in categories are ordinarily consensually achieved, not individually held. However, the placement of

questions into tests is a serious problem which probably shouldn't at all be delegated by admissions officers to test committees. Are there ways in which admissions officers can deal with such decisions themselves? There prove to be ways when the selection of questions for answer are left to the applicant and when the entire set of questions from which the applicant can draw is known to the admissions officer. If an applicant is allowed to respond to questions on line with computer programs and if the processing of responses is arranged as I have noted above, then the record of response transmitted to the admissions officers can be not alone the applicant's processed answer to a problem (complexity, completeness, accuracy) but also general statements (in the particular admissions officer's own terms should he desire such a report) of what categories of questions were attempted and what categories of questions were not attempted.

But how then does an admissions officer compare one applicant with another? This is, of course, the major question when an admissions officer attempts to place the requirements for limitation of applicants into the substance of a set of applicants' responses to the universe of each of several subjects of a man's knowledge. One thing I have been attempting is prevention of a quick answer to this question. I have been trying to lead you to understand that the psychometrician's prior habits of doing a lot of the deciding <u>for</u> an admissions officer are no longer necessary. It is now possible to put before admissions officers theselves a lot of the data on which the Board's achievement committees currently themselves act. It is additionally possible to get that data to an admissions officer in forms such that it has been previously dealt

with by each of the applicants to his institution before the admissions officer is required to act upon it. Hence we would be giving the admissions officer an opportunity to form his impressions about individuals in a substance which is unsummarized prior to his receipt of it but which is available for his summarization in terms including the responses of his applicants. Furthermore, for admissions officers who want such help, it would be possible to work out computer programs partially summarizing in terms of a test's content itself whatever the admissions officer may himself want.

Sharing Ends Determination in Self-Correcting Institutions. A while back I indicated that it is now possible both to widen the context of data processed by admissions officers and more fully to share the problem of ends determination with applicants at the time of their application. I rest my case on the first point with the above. Let's now look at the second point.

Institutions pursue their objectives on grounds that their use of students who are their human resources actually benefits society. These goals and judgments on which they are advanced are currently in serious question by students. I don't mean to favor one set of goals over another. However, I do argue the applicant's right to make an institution aware of his intended use of it as well as the reverse which has been the singular asymmetry of views upon which admissions decisions have so far largely been based. The young individual must come to know that his society is in him as well as he in it. This knowledge is not readily come by in our present society in which the transfer of the societal navigation from others to each person is so solidly impenetrable in our

present educational institutions. At the present time we make every effort to keep a youth in educational navigational systems for a long time and then to release him, naked as it were, to personal navigational systems at the end with little or no effort to cultivate what this shift itself entails. I know that this assertion is subject to debate. Nevertheless I make it on grounds both of the present lack of extensiveness of the infrastructure we know as guidance and of the inadequacies of the theory on which guidance is practiced even in that constricted condition of availability.

If the Board is to improve the theory on which guidance operates, it will have to become involved in the basic substance of guidance, namely the self. I do not use the concept 'self' loosely. I am aware of its history in metaphysics. I too find it mercurial. However, for our discussion, let's use Bronowski's definition (1965). That's a clear definition at any rate. Like Bronowski, in talking about the 'self' I am therefore talking about the grounds which are available to personal awareness. Unlike Bronowski I further feel that comprehension can be facilitated of the processes by which that availability occurs.

The key assumption in my belief is that self-awareness deepens and widens with the comprehension of the processes of choosing. The choice of admissions to continuing education is one context for choice. In the context of admissions to continuing education, the applicant is required to place what he knows in juxtaposition with what he wants. He is then in a position to advance what he wants in terms of what he knows using the resources of an institution of continuing education as a means for his intention and plan. If the admissions officer is to have sufficient

inkling of an applicant's intention and plan, he must have a context in which what the applicant knows can be advanced to him in relation to what the applicant wants. This conjoint pair of conditions becomes possible in a computer-based interactive exchange system such as the Career Machine. Also, this conjoint pair of conditions is better grounded if its origination occurs in the substance of free responses to problems as I have advocated above for the Admissions Machine part of the Career Machine. However, free response to problems will not be enough. What the admissions officer should additionally seek is information concerning the applicant's ability <u>to form</u> problems, not just to solve them. If applicants can only solve problems, they tend to know and interact with the world largely in another's terms, not in their own terms. If an applicant is able to form problems, he is able to react to the world in his own terms as well as in another's terms. If the admissions officer watches an applicant include the views and purposes of others as he advances his own purposes, he can get a substantial view of the sets for accomplishment and for use which an applicant is likely to bring to the institution with him if admitted.

Can A Machine Admit An Applicant to Continuing Education?

Our Challenge

In conclusion I return to my question, 'Can a machine admit an applicant to continuing education?'

I posed my question without expectation that we answer it affirmatively. Instead I merely proposed that we take it seriously in order to

gain new perspective on the theory and practice of testing. The perspective I have attempted to create started from the purpose of admission to the continuation of education as the inclusion of those likely to prove satisfying to the goals of the institution and the exclusion of others. I then expanded that purpose to incorporate the goal of self-correction and the procedures of science as means compatible with achievement of that goal as a generalized attitude.

Having proposed a purpose for admissions to the continuation of education, I outlined an Admissions Machine consistent with its attainment. I finally used the Admissions Machine to adumbrate the assumptions of formal testing in order to pinpoint assumptions in the theory of testing which can be changed as the practice of admissions embraces the concept of an Admissions Machine.

What I propose as necessary will be difficult to accomplish. I have essentially suggested that the major purpose of education is to help persons clarify their own relationship to language and experience. Admissions to continuing education must be consistent with that purpose. To have such consistency, admissions to continuing education should be offered in expectation of self-correcting activity on the part of an applicant and in an atmosphere in which the applicant will agree that such has fairly been the case.

My proposals challenge cherished assumptions in testing and admissions to continuing education, activities which I have come to know as relatively inseparable at the present time. Testing theory is largely defined in terms of admissions purposes; admission practices largely follow test theory. However, my proposals have been advanced in a

context in which my reasoning has been made relatively explicit and in which I have simultaneously proposed some means by which the pragmatic can approach the ideal. The concept of a machine has been my principal means of both being explicit and proposing how my ideal is within realization. I make no claim that what I propose will be easy to attain. I do not even make a claim that a machine <u>can</u> admit an applicant to continuing education. However, I do claim that examination of the question <u>as if</u> a machine <u>could</u> admit an applicant to continuing education has given us a new way to question fundamental purposes and means in admissions to continuing education. In doing so, I have exposed essential flaws in our old means, test theory itself. The flaws consist of purposes realizable by machine and not by test and of the subsequent improvement of test means by machine means.

Fundamental questioning of our purposes and means is vital in our times. To fail either to question in the terms here advanced or to act on new grounds about which we are consensually convinced will be to abandon our present institutions of higher education to new forms in which the self-correcting activity now being sought by college students will find more friendly havens elsewhere.

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